

# DeltaSol<sup>®</sup> AL

**RESOL<sup>®</sup>**

Solar controller for standard solar thermal systems

Manual for the  
specialised craftsman

Installation

Operation

Functions and options

Troubleshooting



The cTUVus certification confirms that the controller is certified to UL 60730-1:2009 and CSA B60730.1:2002.



48004960

Thank you for buying this RESOL product.  
Please read this manual carefully to get the best performance from this unit.  
Please keep this manual safe.

en

Manual

[www.resol.com](http://www.resol.com)

## Safety advice

Please pay attention to the following safety advice in order to avoid danger and damage to people and property.

## Instructions

Attention must be paid to the valid local standards, regulations and directives!

## Information about the product

### Proper usage

The solar controller is designed for electronically controlling standard solar thermal systems in compliance with the technical data specified in this manual. Improper use excludes all liability claims.

### CE Declaration of conformity

The product complies with the relevant directives and is therefore labelled with the CE mark. The Declaration of Conformity is available upon request, please contact the manufacturer.



#### Note

Strong electromagnetic fields can impair the function of the controller.

→ Make sure the controller as well as the system are not exposed to strong electromagnetic fields.

**Subject to technical change. Errors excepted.**

## Target group

These instructions are exclusively addressed to authorised skilled personnel. Only qualified electricians should carry out electrical works. Initial installation must be effected by the system owner or qualified personnel named by the system owner.

## Description of symbols

**WARNING!** Warnings are indicated with a warning triangle!



→ They contain information on how to avoid the danger described.

Signal words describe the danger that may occur, when it is not avoided.

- **WARNING** means that injury, possibly life-threatening injury, can occur.
- **ATTENTION** means that damage to the appliance can occur.



#### Note

Notes are indicated with an information symbol.

→ Arrows indicate instruction steps that should be carried out.

## Disposal

- Dispose of the packaging in an environmentally sound manner.
- Dispose of old appliances in an environmentally sound manner. Upon request we will take back your old appliances bought from us and guarantee an environmentally sound disposal of the devices.

## DeltaSol® AL solar controller

The DeltaSol® AL is a temperature differential controller that offers all the vital functions for a standard solar thermal system. The controller is equipped with the comprehensive System-Monitoring-Display, which shows the system parameters quickly and easily.

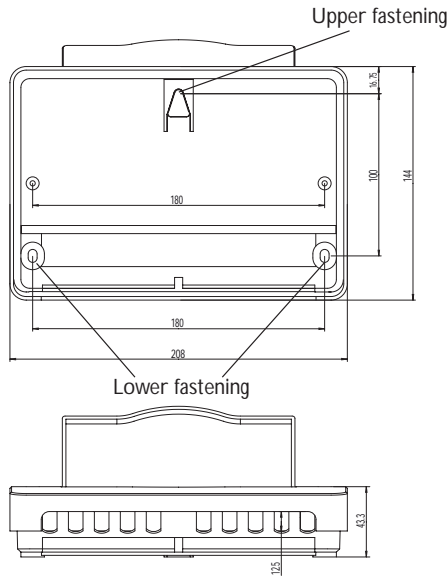
For data communication, the controller is equipped with the RESOLVBus®. Operation and function control are straight forward.

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## 1 Overview

- System-Monitoring-Display
- Up to 3 Pt1000 temperature sensors
- Heat quantity measurement
- Function control
- Solar operating hours counter
- Intuitive operating concept
- Unit °F and °C selectable



### Technical data

**Inputs:** 3 Pt1000 temperature sensors

**Outputs:** 1 electromechanical relay (changeover)

**Switching capacity:** 4 (1) A 240 V~ (electromechanical relay)

**Total switching capacity:** 4 A 240 V~

**Power supply:** 100 ... 240 V~ (50 ... 60 Hz)

**Supply connection:** type Y attachment

**Power consumption** < 0.7 W (Standby)

**Mode of operation:** type 1.B action

**Rated impulse voltage:** 2.5 kV

**Data interface:** RESOL VBus®

**VBus® current supply:** 35 mA

**Functions:** function control, operating hours counter, tube collector function and heat quantity measurement

**Housing:** plastic, PC-ABS and PMMA

**Mounting:** wall mounting, also suitable for mounting into patch panels

**Indication/Display:** System-Monitoring-Display for visualisation, 16-segment display, 7-segment display, 8 symbols for system states, background illumination and operating control LED

**Operation:** 3 push buttons and 1 slide switch

**Protection type:** IP 20/DIN EN 60529

**Protection class:** II

**Ambient temperature:** 0 ... 40 °C [32 ... 104 °F]

**Degree of pollution:** 2

**Dimensions:** 144 x 208 x 43 mm

## 2 Installation

### 2.1 Mounting

#### WARNING! Electric shock!



Upon opening the housing, live parts are exposed!  
→ **Always disconnect the device from power supply before opening the housing!**



#### Note

Strong electromagnetic fields can impair the function of the device.

→ Make sure the device as well as the system are not exposed to strong electromagnetic fields.

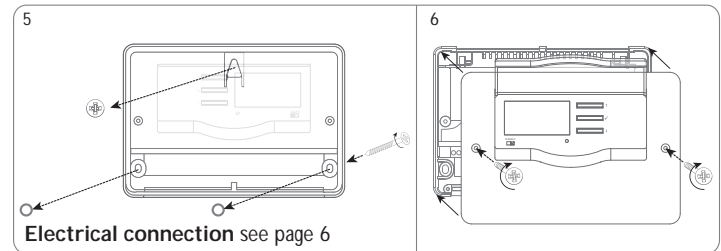
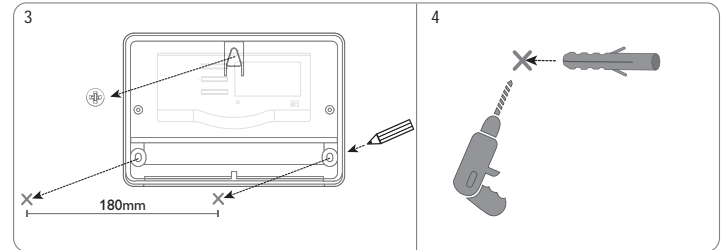
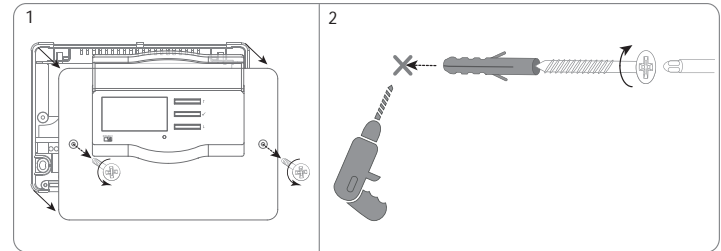
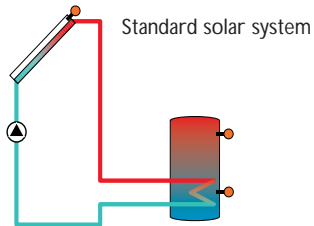
The device must only be located in dry interior rooms.

The controller must additionally be supplied from a double pole switch with contact gap of at least 3 mm.

Please pay attention to separate routing of sensor cables and mains cables.

- Unscrew the crosshead screw from the cover and remove the cover.
- Mark the upper fastening point on the wall. Drill and fasten the enclosed wall plug and screw leaving the head protruding.
- Hang the housing from the upper fastening point and mark the lower fastening points (centres 180 mm).
- Drill and insert the lower wall plug.
- Fasten the housing to the wall with the lower fastening screw and tighten.
- Carry out the electrical wiring in accordance with the terminal allocation (see page 6).
- Put the cover on the housing.
- Attach with the fastening screws.

#### System DeltaSol® AL



## 2.2 Electrical connection

### WARNING! Electric shock!



Upon opening the housing, live parts are exposed!

→ **Always disconnect the device from power supply before opening the housing!**

### ATTENTION! ESD damage!



Electrostatic discharge can lead to damage to electronic components!

→ **Take care to discharge properly before touching the inside of the device! To do so, touch a grounded surface such as a radiator or tap!**



#### Note

Connecting the device to the power supply must always be the last step of the installation!



#### Note

It must be possible to disconnect the device from the mains at any time.

- Install the mains plug such that it is accessible at any time.
- If this is not possible, install a switch that can be accessed.

### Do not use the device if it is visibly damaged!

Attach flexible cables to the housing with the enclosed strain relief and the corresponding screws.

The controller is supplied with power via a mains cable. The power supply of the device must be 100... 240 V~ (50... 60 Hz).

The controller is equipped with 1 **changeover relay** to which a load such as a pump, a valve, etc. can be connected.

10	Grounding terminal ⚡
11	Grounding terminal ⚡
12	Conductor R1-R (normally closed contact)
13	Conductor R1-A (normally open contact)
14	Neutral conductor N

Depending on the product version, mains cables and sensor cables are already connected to the device. If that is not the case, please proceed as follows:

Connect the **temperature sensors** (S1 to S3) to the following terminals with either polarity:

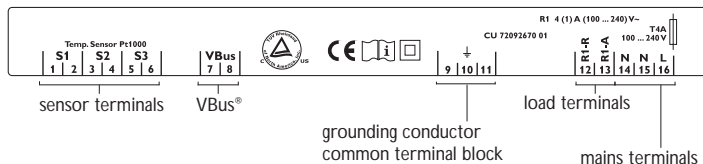
1/2	Sensor 1 (e. g. sensor collector)
3/4	Sensor 2 (e. g. sensor store)
5/6	Sensor 3 (e. g. sensor store top)

Connect the **RESOL VBus®** to the terminals marked **VBus** with either polarity:

7	VBus terminal
8	VBus terminal

The **mains connection** is at the following terminals:

15	Neutral conductor N
16	Conductor L
9	Grounding terminal ⚡



## 2.3 Data communication/Bus

The controller is equipped with the **RESOL VBus®** for data transfer and energy supply to external modules. The connection is to be carried out at the two terminals marked **VBus** (any polarity). One or more **RESOL VBus®** modules can be connected via this data bus, such as:

- RESOL GA3 Large display module
- RESOL SD3 Smart Display
- RESOL DL2 Datalogger

Furthermore, the controller can be connected to a PC or integrated into a network via the RESOL VBus®/USB or VBus®/LAN interface adapter (not included).

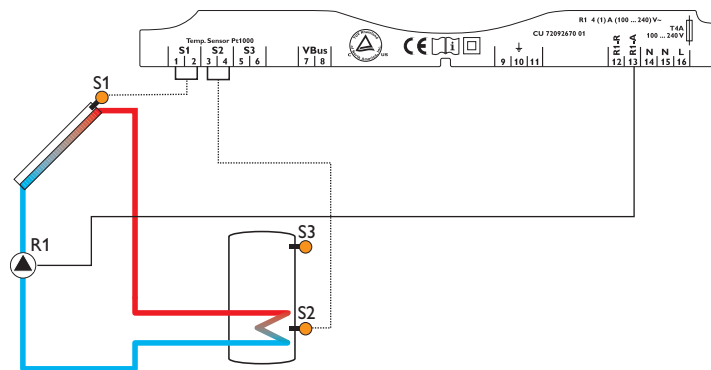
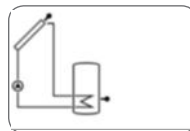


### Note

More accessories on page 19.

## 2.4 Terminal allocation

**Standard solar thermal system** with 1 store, 1 pump and 2 or 3 sensors. The sensors S1/S2 can also be used for heat quantity measurement.



Symbol	Description
S1	Collector sensor
S2	Store sensor base
S3	Store sensor top (optional)
R1-A	Solar pump
N	Neutral conductor
≡	Grounding terminal (common terminal block)
L/N	Mains terminals

## 3 Operation and function

### 3.1 Buttons

The controller is operated via the 3 buttons next to the display:

Button ↑ : Scrolling upwards, increasing adjustment values

Button ✓ : **SET** Confirmation/selection

Button ↓ : Scrolling downwards, reducing adjustment values

During normal operation, display channels will be displayed.

→ In order to scroll between display channels, press buttons ↑ and ↓.

#### Access to adjustment channels

→ Use button ↓ in order to scroll to the last display channel, then press and hold down button ↓ for approx. 3 s.

If an adjustment channel is shown on the screen, **SET** will be displayed on the right-hand side next to the channel name.

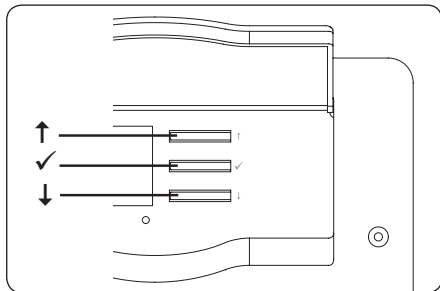
→ Press button ✓ in order to select an adjustment channel.

**SET** starts flashing.

→ Adjust the desired value with buttons ↑ and ↓.

→ Briefly press button ✓.

**SET** permanently appears, the adjusted value has been saved.

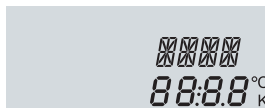


### 3.2 System-Monitoring-Display



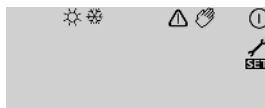
The System-Monitoring-Display consists of 3 blocks: **channel display**, **tool bar** and **system screen**.

#### 3.2.1 Channel display



The **channel display** consists of 2 lines. The upper display line is an alphanumeric 16-segment display. In this line, mainly channel names and menu items are displayed. In the lower 7-segment display, values and parameters are displayed.

#### 3.2.2 Tool bar



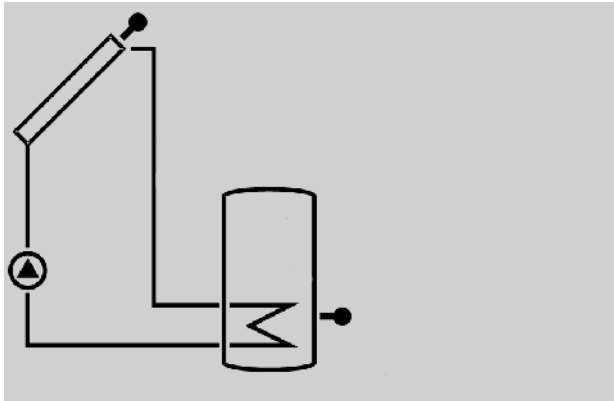
The additional symbols in the **tool bar** indicate the current system state.

Permanently shown	Flashing	Status indications
ⓘ		Relay 1 active
☼		Store maximum limitation active
ⓘ	☼	Collector cooling function active; recooling function active
☼		Antifreeze option activated
ⓘ	☼	Antifreeze function active
☼	☼	Collector minimum limitation active
☼	⚠	Store emergency shutdown active
	⚠	Collector emergency shutdown active
🔧	⚠	Sensor fault S1
🔧 + ☼	⚠	Sensor fault S2
🔧 + ⓘ	⚠	Manual mode relay 1 on
🔧	⚠	Manual mode relay 1 off
	<b>SET</b>	An adjustment channel is being changed (set mode)



### 3.2.3 System screen

The system scheme is indicated on the System-Monitoring-Display. It consists of several system component symbols which are – depending on the current status of the system – either flashing or permanently shown.



**Collector**  
with collector sensor



**Temperature sensor**



**Store**  
with heat exchanger

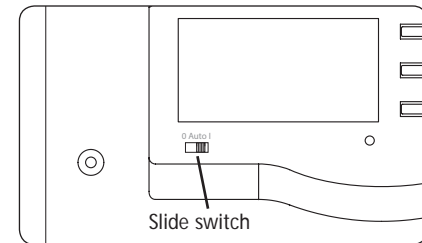


**Pump**

### 3.3 Slide switch

By means of the slide switch the relay can be manually switched on (I), switched off (0) or put into automatic mode (Auto).

- Manually Off= 0 (left)
- Manually On= I (right)
- Automatic = Auto (centre)



### 3.4 Flashing codes

#### 3.4.1 System screen flashing codes

- Pump symbol is flashing when the relay is active.
- Sensor symbols are flashing if the corresponding sensor display channel is selected.
- Sensors symbols are flashing quickly in the case of a sensor fault.

#### 3.4.2 LED flashing codes

Green: everything OK

Red/green flashing: initialisation phase  
manual mode

Red flashing: sensor fault  
(sensor symbol is flashing quickly)

## 4 Control parameters and display channels

### 4.1 Channel overview



#### Note

Only if the temperature sensor is connected, will S3 be displayed!

#### Display channels

Channel	Description	Connection terminal	Page
COL	x Temperature collector	S1	10
TST	x Temperature store base	S2	10
S3	x Temperature sensor 3	S3	10
h P	x Operating hours relay	R1-A	11
kWh	x* Heat quantity in kWh	-	11
MWh	x* Heat quantity in MWh	-	11

#### Adjustment channels

Channel	Description	Factory setting	Page
DT O	x Switch-on temperature difference	6.0 K [12.0 °Ra]	11
DT F	x Switch-off temperature difference	4.0 K [8.0 °Ra]	11
S MX	x Maximum store temperature	60 °C [140 °F]	12
EM	x Collector emergency shutdown/collector limit temperature	140 °C [280 °F]	12
OCX	x Collector cooling option	OFF	12
CMX	x* Maximum collector temperature	120 °C [250 °F]	12
OCN	x Collector minimum limitation option	OFF	13
CMN	x* Minimum collector temperature	10 °C [50 °F]	13
OCF	x* Antifreeze function option	OFF	13
CFR	x Antifreeze temperature	4.0 °C [40 °F]	13
OREC	x Recooling option	OFF	13
OTC	x Tube collector option	OFF	14
FMAX	x* Maximum flow rate	6.0 l	14
MEDT	x* Heat transfer fluid	1	14
MED%	x* Antifreeze concentration	45%	14
UNIT	x Temperature unit	°C	15
LANG	x Language	dE	15
DSAL x.xx	Version number		

#### Legend:

Symbol	Description
x	Channel is available
x*	Channel is available, if the corresponding option is activated.

### 4.2 Display channels

#### Display of collector temperature



#### COL

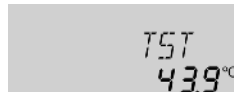
Collector temperature

Display range: -40 ... +260 °C [-40 ... +500 °F]

Indicates the collector temperature.

- COL : Collector temperature

#### Display of store temperature



#### TST

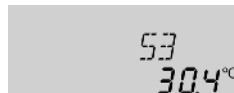
Store temperature

Display range: -40 ... +260 °C [-40 ... +500 °F]

Indicates the store temperature.

- TST : Temperature store

#### Display sensor 3



#### S3

Sensor temperature

Display range: -40 ... +260 °C [-40 ... +500 °F]

Indicates the temperature measured at the additional sensor (without control function).

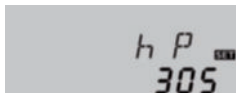
- S3 : Temperature sensor



#### Note

Only if the temperature sensor is connected, will S3 be displayed!

## Operating hours counter



### h P

Operating hours counter

Display channel

The operating hours counter accumulates the operating hours (**h P**) of the relay. Full hours are displayed.

The accumulated operating hours can be set back to zero. As soon as the operating hours channel is selected, the symbol **SET** is displayed.

- In order to access the reset mode of the counter, press button ✓ for approx. 2 s. **SET** starts flashing and the operating hours will be set back to zero.
- In order to finish the reset, press button ✓.

In order to interrupt the reset process, do not press any button for about 5 s. The display returns to the display mode.

## Display of heat quantity



### kWh

Heat quantity in kWh/MWh

Display channel

Indicates the heat quantity produced in the system. It is shown in kWh in the **kWh** channel and in MWh in the **MWh** channel. The overall heat quantity results from the sum of both values.

The accumulated heat quantity can be set back to zero. As soon as one of the display channels of the heat quantity is selected, the symbol **SET** is displayed.

- In order to access the reset mode of the counter, press button ✓ for approx. 2 s. **SET** starts flashing and the heat quantity value will be set back to zero.
- In order to finish the reset, press button ✓.

In order to interrupt the reset process, do not press any button for about 5 s. The display returns to the display mode.



### MWh

## 4.3 Adjustment channels

Access to adjustment channels:

- Use button ↓ in order to scroll to the last display channel, then press and hold down button ↓ for approx. 3 s.

### ΔT control



#### DT O

Switch-on temperature difference

Adjustment range: 1.0 ... 20.0 K [2.0 ... 40.0 °Ra]

Factory setting: 6.0 K [12.0 °Ra]



#### DT F

Switch-off temperature difference

Adjustment range: 0.5 ... 19.5 K [1.0 ... 39.0 °Ra]

Factory setting: 4.0 K [8.0 °Ra]

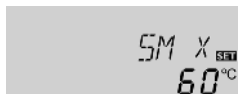


#### Note

The switch-on temperature difference must be at least 0.5 K [1.0 °Ra] higher than the switch-off temperature difference.

The controller works as a standard differential controller. If the temperature reaches or exceeds the switch-on temperature difference, the pump switches on. When the temperature difference reaches or falls below the adjusted switch-off temperature difference, the respective relay switches off.

## Maximum store temperature



### S MX

Maximum store temperature

Adjustment range: 4 ... 95 °C [40 ... 200 °F]

Factory setting: 60 °C [140 °F]

Hysteresis 2 K [4 °Ra]

If the store temperature reaches the adjusted maximum temperature, the store will no longer be loaded in order to avoid damage caused by overheating. A non-adjustable hysteresis of 2 K [4 °Ra] is set for the maximum store temperature. If the maximum store temperature is exceeded, ✱ is displayed. Sensor S2 is used as the reference sensor.

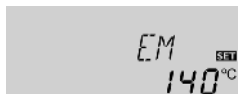


### Note

If the collector cooling function is activated, the store temperature may exceed the adjusted maximum value. In order to prevent system damage, the controller is also equipped with an integrated store emergency shutdown, deactivating the system if the store reaches 95 °C [200 °F].

## Collector emergency temperature

### Collector emergency shutdown



### EM

Collector emergency temperature

Adjustment range: 110 ... 200 °C [230 ... 400 °F]

Factory setting: 140 °C [280 °F]

Hysteresis: 10 K [20 °Ra]

If the collector temperature exceeds the adjusted collector emergency temperature (**EM**), the solar pump is switched off in order to protect the system components against overheating.

If the maximum collector temperature is exceeded, ⚠ is displayed (flashing).

## Collector cooling



### OCX

Collector cooling option

Selection: OFF / ON

Factory setting: OFF



### CMX

Collector maximum temperature

Adjustment range: 100 ... 190 °C

[210 ... 380 °F]

Factory setting: 120 °C [250 °F]

Hysteresis: 5 K [10 °Ra]

The collector cooling function keeps the collector temperature within the operating range by heating the store. If the store temperature reaches 95 °C [200 °F] the function will switch off for safety reasons.

If the store temperature exceeds the adjusted maximum store temperature, the solar system is switched off. If the collector temperature increases to the adjusted maximum collector temperature, the solar pump is activated until the collector temperature falls below the maximum collector temperature. The store temperature may then exceed the maximum temperature, but only up to 95 °C [200 °F] (emergency shutdown of the store).

### If the OREC option is additionally activated:

If the store temperature is higher than the maximum store temperature (**SMX**) and if the collector temperature is at least 5 K [10 °Ra] below the store temperature, the solar system remains active until the store is cooled down below the adjusted maximum store temperature (**SMX**) via the collector and the pipework. If the collector cooling function is active, ✱ is displayed (flashing). Due to the combined cooling functions, the system will have a longer operation time on days with excess solar irradiation and guarantees thermal relief of the collector field and the heat transfer fluid.

## Minimum collector limitation



### OCN

Collector minimum limitation option

Selection: OFF/ON

Factory setting: OFF

If the collector minimum limitation option is activated, the pump (R1) is only switched on if the adjustable collector minimum temperature is exceeded. The minimum temperature prevents the pump from being switched on too often at low collector temperatures. A non-adjustable hysteresis of 5 K [10 °Ra] is set for this function. If the collector minimum limitation is active, ❄️ is displayed (flashing).



### CMN

Minimum collector temperature

Adjustment range: 10 ... 90 °C

[50 ... 200 °F]

Factory setting: 10 °C [50 °F]

## Antifreeze function



### OCF

Antifreeze option

Selection: OFF/ON

Factory setting: OFF



### CFR

Antifreeze temperature

Adjustment range: -10 ... +10 °C

[10 ... 50 °F]

Factory setting: 4.0 °C [40 °F]

The antifreeze function activates the loading circuit between the collector and the store when the temperature falls below the adjusted antifreeze temperature. This will protect the fluid against freezing or coagulating. If the adjusted antifreeze temperature is exceeded by 1 K [2 °Ra], the loading circuit will be deactivated.

If the antifreeze function is activated, ❄️ is displayed. If the antifreeze function is active, ⓪ and ❄️ are displayed (flashing).



### Note

Since this function uses the limited heat quantity of the store, the antifreeze function should be used in regions with few days of temperatures around the freezing point.

## Recooling function



### OREC

Recooling option

Selection: OFF/ON

Factory setting: OFF

If the store temperature reaches the adjusted maximum store temperature (**SMX**), the controller keeps the solar pump running in order to prevent the collector from being overheated. The store temperature may increase, but only up to 95 °C [200 °F] (emergency shutdown of the store).

If the store temperature is higher than the maximum store temperature (**SMX**) and if the collector temperature is lower than the store temperature, the solar system remains active until the store is cooled down below the adjusted maximum store temperature (**SMX**) via the collector and the pipework.



### Note

Only use the recooling function if the collector cooling function is activated.

## Tube collector function



### OTC

Tube collector function

Adjustment range: OFF/ON

Factory setting: OFF

This function is used for improving the switch-on behaviour in systems with non-ideal sensor positions (e. g. with some tube collectors).

If the controller detects an increase in collector temperature by 2 K [4 °Ra] compared to the previously stored collector temperature, the solar pump will be switched-on for about 30 s in order to detect the fluid temperature. The current collector temperature will then be saved as a new reference value. If the measured temperature (new reference value) is exceeded by 2 K [4 °Ra], the solar pump will again run for 30 s.

If the switch-on difference between the collector and the store is exceeded during the runtime of the solar pump, the controller will automatically switch to solar loading.

If the collector temperature decreases by 2 K [4 °Ra] during a loading break, the switch-on value for the tube collector function will be recalculated.

## Heat quantity measurement



### FMAX

Flow rate in l/min

Adjustment range: 0 ... 20

in steps of 0.1

Factory setting: 6.0



### MEDT

Heat transfer fluid

Adjustment range: 0 ... 3

Factory setting: 1

### Heat transfer fluid:

0 : Water

1 : Propylene glycol

2 : Ethylene glycol

3 : Tyfocor® LS/G-LS



### MED%

Antifreeze concentration in (vol-) %  
(MED% will not be displayed when  
MEDT 0 or 3 is used)

Adjustment range: 20 ... 70

Factory setting: 45

Information on the flow rate, the values of the reference sensors flow and store as well as on the heat transfer fluid are used for calculating the heat quantity supplied.

Heat quantity measurement is possible if a flowmeter is used.

- ➔ Read the flow rate (l/min) and adjust it in the **FMAX** channel.
- ➔ Adjust the antifreeze type and concentration of the heat transfer fluid in the channels **MEDT** and **MED%**.

## Temperature unit



### UNIT

Temperature unit

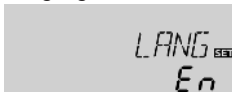
Selection: °C/°F

Factory setting: °C

In this adjustment channel, the display unit for temperatures and temperature differences can be chosen. The unit can be switched between °C/K and °F/°Ra during operation.

Temperatures and temperature differences in °F and °Ra are displayed without units. If the indication is set to °C, the units are displayed with the values.

## Language



### LANG

Language selection

Selection: dE, En, It, Fr

Factory setting: dE

In this adjustment channel the menu language can be selected.

- dE : German
- EN : English
- It : Italian
- Fr : French

## 5 Troubleshooting

### WARNING! Electric shock!

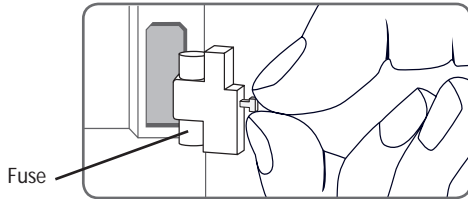


Upon opening the housing, live parts are exposed!

→ **Always disconnect the device from power supply before opening the housing!**

The controller is protected by a fuse. The fuse holder (which also holds the spare fuse) becomes accessible when the cover is removed. To replace the fuse, pull the fuse holder from the base.

If a malfunction occurs, the display symbols will indicate an error code (see page 8).



Operating control LED flashes red. The symbol is indicated on the display and the symbol is flashing.

Sensor fault. An error code instead of a temperature is shown on the sensor display channel.

888.8

- 88.8

Cable is broken. Check the cable.

Short circuit. Check the cable.

Disconnected temperature sensors can be checked with an ohmmeter. Please check if the resistance values correspond with the table.

C	F	Ω	C	F	Ω
-10	14	961	55	131	1213
-5	23	980	60	140	1232
0	32	1000	65	149	1252
5	41	1019	70	158	1271
10	50	1039	75	167	1290
15	59	1058	80	176	1309
20	68	1078	85	185	1328
25	77	1097	90	194	1347
30	86	1117	95	203	1366
35	95	1136	100	212	1385
40	104	1155	105	221	1404
45	113	1175	110	230	1423
50	122	1194	115	239	1442

Resistance values of Pt1000 sensors



### Note

For answers to frequently asked questions (FAQ) see [www.resol.com](http://www.resol.com).



Operating control LED is permanently off.

If the operating control LED is off, check the power supply of the controller. Is it disconnected?

no

The fuse of the controller could be blown. The fuse becomes accessible when the cover is removed. The fuse can then be replaced.

yes

Check the supply line and reconnect it.

Pump is overheated, but no heat transfer from the collector to the store, flow and return have the same temperature; perhaps also bubbling in the lines.

Air or gas bubbles in the system?

no

yes

Vent the system; increase the system pressure to a static primary pressure of at least plus 0.5 bar; if necessary continue to increase pressure; switch the pump on and off for a short time.

Is the collector circuit blocked at the dirt trap?

yes

Clean dirt trap

Pump starts for a short moment, switches off, switches on again, etc.

Temperature difference at the controller too small?

no

yes

Change  $\Delta T_{on}$  and  $\Delta T_{off}$  correspondingly.

Wrong position of collector sensors?

no

yes

Mount the collector sensor at solar flow (warmest collector output); use immersion sleeve of the respective collector.

Plausibility control of the option tube collector special function

Pump starts up very late.

Switch-on temperature difference  $\Delta T_{on}$  too large?

no

yes

Change  $\Delta T_{on}$  and  $\Delta T_{off}$  correspondingly.

Non-ideal position of the collector sensor (e. g. flatscrew sensor instead of sensor in immersion sleeves).

yes

Activate tube collector function if necessary.

o.k.

The temperature difference between store and collector increases enormously during operation; the collector circuit cannot dissipate the heat

Collector circuit pump defective?

no

yes

Check/replace it

Heat exchanger calcified?

no

yes

Decalcify it

Heat exchanger blocked?

no

yes

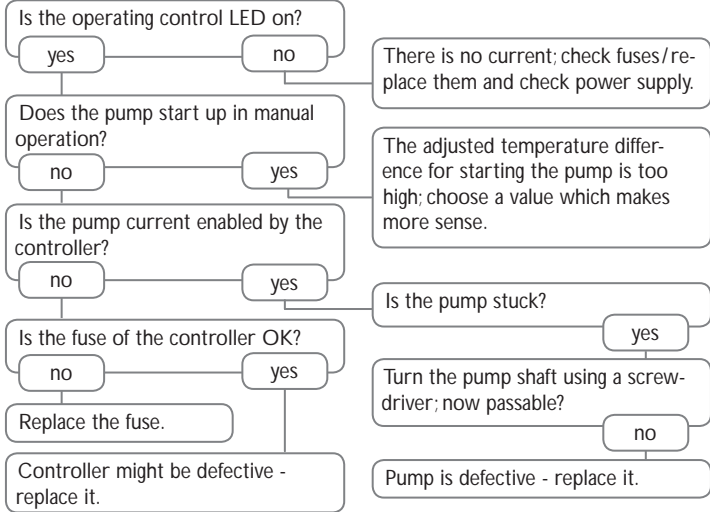
Clean it

Heat exchanger too small?

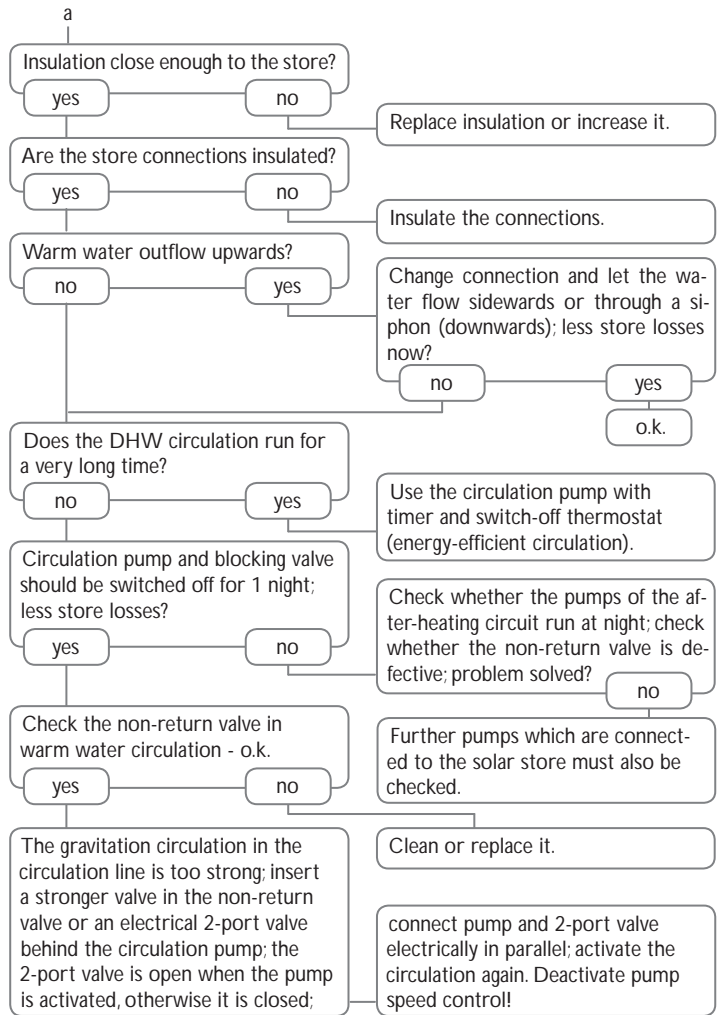
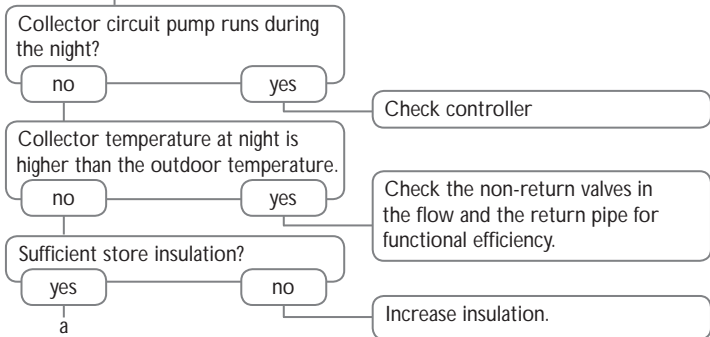
yes

Replace with correctly sized one.

The solar circuit pump does not work, although the collector is considerably warmer than the store



Store cools down at night.



## 6 Accessories

### 6.1 Sensors



#### Sensors

The product range includes high-precision platinum temperature sensors, flatscrew sensors, outdoor temperature sensors, indoor temperature sensors, cylindrical clip-on sensors, also as complete sensors with immersion sleeve.



#### Overvoltage protection device

In order to avoid overvoltage damage at collector sensors (e. g. caused by local lightning storms), we recommend installing the overvoltage protection RESOL SP10.

### 6.2 VBus® accessories



#### SD3 Smart Display/GA3 Large Display

The remote displays are used for visualising data issued by the controller: collector temperature, store temperature and energy yield of the solar thermal system. The use of high-efficiency LEDs and filter glass assures a high optical brilliance and good readability even in poor visibility conditions and from a larger distance. Both remote displays are connected to the controller by means of the RESOL VBus®.



#### AM1 Alarm module

The AM1 Alarm Module is designed to signal system failures. It is to be connected to the VBus® of the controller and issues an optical signal via the red LED if a failure has occurred. The AM1 also has a relay output, which can e. g. be connected to a building management system (BMS). Thus, a collective error message can be issued in the case of a system failure.



#### VBus®/LAN interface adapter

The VBus®/LAN interface adapter is designed for the direct connection of the controller to a PC or router. It enables easy access to the controller via the local network of the owner. Thus, controller access and data charting can be effected from every workstation of the network. The VBus®/LAN interface adapter is suitable for all controllers equipped with a RESOL VBus®. The RESOL ServiceCenter software is included.



#### DL2 Datalogger

This additional module enables the acquisition and storage of large amounts of data (such as measuring and balance values of the solar system) over a long period of time. The DL2 can be configured and read-out with a standard Internet browser via its integrated web interface. For transmission of the data stored in the internal memory of the DL2 to a PC, an SD card can be used. The DL2 is appropriate for all controllers with RESOL VBus®. It can be connected directly to a PC or router for remote access and thus enables comfortable system monitoring for yield monitoring or for diagnostics of faults.

Distributed by:

**RESOL – Elektronische Regelungen GmbH**

Heiskampstraße 10  
45527 Hattingen / Germany

Tel.: +49 (0) 23 24 / 96 48 - 0

Fax: +49 (0) 23 24 / 96 48 - 755

[www.resol.com](http://www.resol.com)

[info@resol.com](mailto:info@resol.com)

**Important note**

The texts and drawings in this manual are correct to the best of our knowledge. As faults can never be excluded, please note:

Your own calculations and plans, under consideration of the current standards and directions should only be basis for your projects. We do not offer a guarantee for the completeness of the drawings and texts of this manual - they only represent some examples. They can only be used at your own risk. No liability is assumed for incorrect, incomplete or false information and / or the resulting damages.

**Note**

The design and the specifications can be changed without notice.

The illustrations may differ from the original product.

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